

WHAT IS CLAIMED IS:

1. A manipulator for servicing tubes extending through a tube sheet, comprising:
 - (a) a base member having a holder for holding tooling or an inspection device, the base member also having at least one gripper for releaseably gripping a tube extending through the tube sheet;
 - (b) a block member connected to the base member for linear movement and rotation relative thereto; and
 - (c) a foot member connected to the block member for linear movement relative thereto, the foot member having at least one gripper for releaseably gripping a tube extending through the tube sheet.
2. The manipulator of Claim 1 wherein the block member has two directions of linear travel between the block member and the base member.
3. The manipulator of Claim 2 wherein the two directions of linear travel are respectively in the horizontal and vertical directions.
4. The manipulator of Claim 1 wherein at least one of the grippers exerts a force in a direction to draw the member associated with the at least one of the grippers toward the tube sheet.
5. The manipulator of Claim 4 including a stop that functions in with the at least one of the grippers exerting the force to draw said member in the direction of the tube sheet to maintain said member a predetermined fixed distance from the tube sheet.
6. The manipulator of Claim 1 wherein the foot member and block member each have at least two spaced grippers.
7. The manipulator of Claim 1 wherein each of the grippers includes insertion fingers that are respectively insertable into a corresponding one of said tubes

extending through the tube sheet including a limit switch corresponding to each gripper that will verify an acceptable degree of insertion into the corresponding tube.

8. The manipulator of Claim 1 wherein each of the grippers includes insertion fingers that are respectively insertable into a corresponding one of said tubes extending through the tube sheet wherein the insertion fingers are biased against an interior of the corresponding tube by an internal piston that forces bearings to move up a tapered raceway between the piston and the interior of the insertion fingers forcing the insertion fingers out against the interior of the corresponding tube.

9. The manipulator of Claim 8 wherein the insertion fingers are spring biased in a gripping position when inserted a predetermined distance into said tubes to avoid the loss of gripping power if a motive power of the piston is lost.

10. The manipulator of Claim 1 wherein the manipulator is sized to permit more than one independently operated manipulator, of substantially the same design, to be suspended from an underside of the tube sheet in an inlet and/or outlet section of a hemispherical channel head of a steam generator and be operated in parallel.

11. The manipulator of Claim 10 wherein the more than one independently operated manipulator are operated at the same time.

12. The manipulator of Claim 1 wherein the manipulator is approximately thirty pounds or less.

13. The manipulator of Claim 12 wherein the manipulator supports a payload of seventy pounds or less.

14. The manipulator of Claim 1 including pneumatic and/or hydraulic drives in combination with a single motorized drive.